

REMARKS

This is in response to the Examiner's Action dated 13 July 2006. In paragraph 1 of the Action, the Examiner comments regarding cancellation of Figures 2 through 6. The specification has been appropriately amended in our Amendment After Interview submitted April 20, 2006. The Examiner has noted that it has been entered. Applicants have enclosed a letter from an expert, Dr. Caple, who endorses the conclusions of the Harrison declaration and further distinguishes the art.

Before discussing the art rejection, the Examiner comments on the term "unmodified" cyclodextrin. The Examiner's comments are not clear and are not understood. The term "unmodified" means that the cyclodextrin has no changes to the molecule and no changes to any of the hydroxyl (-OH) residues or the cyclodextrin molecule including the addition of substituents on any hydroxyl group. Applicants agree the term "unmodified" is broader but includes the term "unsubstituted". "Unsubstituted" means that the groups on the molecule are not reacted to form substituent groups.

The claims recite a chip of virgin polymer blended with cyclodextrin grafted polymer. The polymer has a specified amount of maleic anhydride functionality. None of this is taught in the art.

In paragraphs 2-4, the Examiner comments on rejections under 35 U.S.C. § 112. In light of the Examiner's comments, Applicants have canceled claim 96 and amended claim 165 with an appropriate dependency. As such, the rejections are moot.

The Examiner has rejected claims 16-19, 21, 25-29, 82-91, 93-96 and 162-164 under 35 U.S.C. § 103(a) over Wood et al., U.S. Patent No. 5,882,565 or Wood et al., EP 1 559 746, in view of Yahiaoui et al., U.S. Patent No. 6,613,703 or Frank et al., U.S. Patent No. 6,851,462, Pitha et al., U.S. Patent No. 5,173,481, or Sun et al., U.S. Patent No. 6,689,378, or Yoshinaga, JP 03100065. Wood et al., EP 1 559 746 is not prior art to this application. None of the other references relate to cyclodextrin grafted to a polyolefin as claimed, a blended chip, a blend of the grafted polymer and virgin polymer or the process of grafting cyclodextrin through a maleic anhydride group to a polyolefin. Applicants respectfully traverse the rejection.

In previous Actions, Applicants' argument and the previously filed Harrison declaration have demonstrated that the Wood et al. reference, U.S. Patent No. 5,882,565, relates to small

molecule derivatized cyclodextrin and this reference does not suggest, in any way to one of ordinary skill in the art, a cyclodextrin grafted through a maleic anhydride group to a polyolefin backbone. Nor does it teach blending such a grafted material with virgin polymer. There is no logical basis for a rejection of the claims based on Wood et al., U.S. Patent No. 5,882,565. The Examiner has not explained why the averments of the Harrison declaration have been ignored. The enclosed Caple letter also concludes that the concept of grafting CD onto a polyolefin through a maleic group is not suggested by the cited art (see, ¶¶ 2-3). Since this response and declaration establishes that the grafted polymer of the invention and the small molecule substituted material of the prior art are distinct and not related in this art, this distinction is accepted and the claims are allowable. Accordingly, Applicants respectfully request the Examiner withdraw any rejection based on this reference.

The Caple letter also demonstrates that this cited prior art does not teach cyclodextrin grafted to polyolefin and such technology is not related to the prior art (see, ¶¶ 2-3).

Further, Wood et al., EP 1 559 746, is not prior art to this application. The EP 1 559 746 filing was made on 29 January 2004 and became prior art when published 3 April 2005. The earliest effective date for the claims in examination is 10 December 2002. Wood et al., EP 1 559 746, cannot be prior art since the filing date and publication date for this reference are well after the effective filing date of these claims. The instant application was based on Wood et al., U.S. Provisional Serial No. 60/432,523 having a filing date of 10 December 2002 (the utility case was filed 25 September 2003), both of which contains a disclosure of the cyclodextrin grafted through a maleic anhydride group to the polyolefin which brings the effective filing date to more than two years prior to the filing date of the Wood et al. EP 1 559 746 and the actual filing date more than eighteen months before the earliest date of the reference.

The Examiner should note that while this non-convention EP filing is the identical invention, has the identical inventorship and the identical Assignment as the instant application under examination. As such, Applicants can remove this application, since it is Applicants' own filing invention of the identical invention.

Accordingly, neither Wood et al., U.S. Patent No. 5,882,565 nor Wood et al., EP 1 559 746, constitutes prior art that teaches a blended chip, blending a grafted polyolefin with virgin polyolefin or cyclodextrin grafted through a maleic anhydride group onto a polyolefin. In fact,

Wood et al., U.S. Patent No. 5,882,565, teach away from the invention since this specification discloses and enables only the use of small molecule substituents such as an acetyl cyclodextrin or a methoxy cyclodextrin as an additive to a thermoplastic. In no way, either explicitly or inherently, does the cyclodextrin of the Wood et al. U.S. reference become grafted to the thermoplastic polymer.

Since none of the primary references teach the invention. The rejection must fail.

We now look to the secondary references for their relation to the invention. None of the secondary references teach a cyclodextrin grafted polyolefin, a chip, blending the cyclodextrin grafted polyolefin with virgin polymer or the process of grafting a cyclodextrin to a polyolefin through a maleic anhydride group.

Yahiaoui et al., U.S. Patent No. 6,613,703, coat a thermoplastic non-woven fiber with a composition including a cyclodextrin. A bond between the cyclodextrin and the thermoplastic non-woven is formed using radiation. The resulting product is a thermoplastic water permeable non-woven fabric. The resulting product is useful in absorbent articles or protective garments, battery separator technology, etc. Yahiaoui does not disclose a chip grafting cyclodextrin to a polyolefin through an anhydride functional group, does not disclose a chip of shaped polyolefin and does not disclose combining the functionalized polyolefin with an unfunctionalized polyolefin at the claimed amount. The thermoplastic in the reference is coated with a cyclodextrin and is irradiated to bond the cyclodextrin to the underlying polymer with no need for an intermediate chip formation step and no virgin polymer (see the reference at Column 2, line 57 through Column 3, line 23).

Frank et al., U.S. Patent No. 6,851,462, disclose a rubber blended with 1.5 to 50 parts of cyclodextrin per 100 parts of rubber. Frank et al. copy the technology of Wood et al., U.S. Patent No. 5,882,565, and apply it to a rubber. The rubber of Frank et al. is not thermoplastic nor is it a polyolefin as that term is disclosed in the invention. The rubbers of the invention are elastomers such as polychloroprene, polybutadiene, polyisoprene, EPDM rubbers and others. The reference teaches that the cyclodextrin is modified and is placed at a form compatible with the rubber and is blended with the rubber. There is no indication that the cyclodextrin of Frank et al. is reactive with the rubber or that the rubber has any reactive group that will react with the cyclodextrin for grafting purposes. No grafting can be asserted based on Frank et al. Accordingly, Frank et al. teach only blending a cyclodextrin compound with a rubber.

Pitha et al., U.S. Patent No. 5,173,481, teach a method for ensuring the preparation of a monosubstituted alpha-, beta-, or gamma-cyclodextrin. The reaction method uses the step of reacting the cyclodextrin with an epoxide reactant. The reference teaches nothing about blending with grafting cyclodextrin through a maleic anhydride group through a polyolefin and little in Pitha et al. suggests its use in any blended product.

Sun et al., U.S. Patent No. 6,689,378, teach covalently binding a cyclodextrin to a non thermoplastic cellulosic-type (polysaccharide) fiber. Sun et al. do not teach a thermoplastic polyolefin, a chip, does not teach grafting cyclodextrin through a maleic anhydride group to a polyolefin, and does not teach blending a grafted material with virgin polymer to form a final product. The Caple letter states that the Sun et al. reference is a cellulosic polymer and its technology is not related to the invention (see, ¶ 4). The reference teaches modifying a non thermoplastic cellulosic-type fiber materials to obtain articles such as tissues, personal care articles wherein the surface bonded cyclodextrin on the cellulosic fiber provides useful properties. In Sun et al., the cyclodextrin is bonded to the cellulose using "crosslinking means" reactive with a cellulosic material not a polyolefin. The portion in Sun et al. beginning at Column 7, lines 15 through Column 8, line 29, teaches a variety of functionalized general polymers. None of these relate to the polyolefins of the current claims.

Lastly, Yoshinaga, JP 03100065, simply blends cyclodextrin in a polypropylene as an additive. There is no disclosure of any grafting or reactive group on the polymer. there is no indication of reactivity between the thermoplastic polypropylene and the cyclodextrin.

The Examiner states on page 5 of the Action:

The unmodified cyclodextrin is known in the prior art.
Each of the secondary references discloses using an
unmodified starting cyclodextrin.

In light of the fact, the starting unmodified cyclodextrin upon the contacting with a functionalized polyolefin or other functionalized thermoplastic resin having grafted functional polar group will inherently produce derivitized cyclodextrin by chemical reaction between the -OH group in the cyclodextrin and a grafted polar group of said polyolefin or other grafted polar group of the thermoplastic resin.

The Examiner is assuming that the polyolefin is functionalized. Nothing in the reference suggests that. The Examiner's conclusion is not based on an enabling disclosure. The secondary references discussed above do not teach such a grafting reaction. The Caple letter demonstrates (see, ¶ 3) that the grafting reaction requires free radical reaction conditions. Nothing in this art suggests that a free radical coupling environment is created that would lead to the formation of a cyclodextrin grafted polyolefin as claimed.

Further, inherency is not applicable in this rejection. Inherency is applicable only when the prior art reference discloses the invention as claimed. In inherency, the entire structure is necessarily produced from the teachings in the prior art. Since the prior art does not teach a chip or blending a grafted polyolefin with virgin polymer, inherency is not applicable. The materials of the secondary references are not polyolefins as that term is used in this art. Inherency cannot be used to disclose the existence of only one element of a claimed structure. Because the Examiner has not made a *prima facie* case of obviousness, Applicants respectfully request withdrawal of the rejection and reconsideration of the claims.

For a *prima facie* case of obviousness under 35 U.S.C. § 103(a), the prior art reference (or combination of references) must teach the claim limitations in such a way that the claimed invention would be obvious to a person of skill in the art. *See, e.g., In re Vaeck*, 947 F.2d 488, (Fed. Cir. 1991). The Examiner has the initial burden to make a *prima facie* case. *See, e.g., In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992).

Where an obviousness rejection is based on an inherent disclosure in the prior art, the examiner has the burden to provide evidence of inherency. *See* MPEP § 2112. In other words, in order to find inherency from a combination of references, there must be a supporting teaching in the references. An inherent property is not necessarily known by a person of skill in the art, and therefore, an inherent disclosure cannot be the basis for an obviousness rejection. *See In re Newell*, 891 F.2d 899, 901 (Fed. Cir. 1989) (citing *In re Spormann*, 363 F.2d 444, 448 (C.C.P.A. 1966)). Obviousness and anticipation by inherency are separate and distinct concepts. *See, e.g., Trintec Industries, Inc. v. TOP-USA Corp.*, 295 F.3d 1292, 1296 (Fed. Cir. 2002).

The following cases illustrate the inapplicability of inherency to the obviousness rejection as made by the Examiner in the current case. *In re Newell* involved a patent for a tape drive system which included a belt-to-capstan drive for moving the tape rollers. This differed from the prior art, which disclosed wheel-to-wheel or capstan-to-capstan drives. *In re Newell*, 891 F.2d at

900. During prosecution, the examiner rejected the claims as obvious over three references. On appeal, the Board held that the claims merely combined elements present in prior art devices, and that such a combination was obvious. Furthermore, the fact that the claimed belt drive would provide better surface contact with the capstan was inherent. *Id.* at 901. The Federal Circuit reversed, because there was no suggestion or teaching in the cited prior art references to combine the various elements in the prior art in the way that the inventor had combined them. *Id.* at 901. Judge Newman, writing for the court, noted that "a retrospective view of inherency is not a substitute for some teaching or suggestion which supports the selection and use of the various elements in the claimed combination." *Id.* (citing *SmithKline Diagnostics v. Helena Laboratories Corp.*, 859 F.2d 878, 886–67 (Fed. Cir. 1988)).

Similarly, in *In re Rijckaert*, the claims were directed to an apparatus for recording and reproducing an electrical signal on a magnetic record carrier. *In re Rijckaert*, 9 F.3d 1531, 1532 (Fed. Cir. 1993). The Examiner rejected the claims as obvious over two references, and the rejection was subsequently upheld by the Board. In affirming, the Board assumed certain claim limitations, finding that these limitations were inherent in the cited prior art reference. *Id.* at 1533. On appeal, the Federal Circuit reversed, holding that the examiner's assumptions did not constitute a teaching or suggestion that would render the invention obvious. *Id.* The conditions described in the prior art, while optimal, were not inherent. *Id.* at 1534. The fact that a result *could* be obtained from a particular set of conditions was not sufficient to show inherency. *Id.* For inherent anticipation, the result had to necessarily flow from that set of conditions. "That which is inherent is not necessarily known. Obviousness cannot be predicated on what is unknown." *Id.* (citing *Spormann*, 363 F.2d at 448).

The Examiner has failed to make a *prima facie* case of obviousness, and has further failed to provide any evidence of inherency other than a leap of logic.

The Examiner further cites secondary references to support the rejection. None of these references are related to polyolefins. These references teach modified rubber, small molecule derivatives of cyclodextrin, polysaccharide fiber, and additive cyclodextrin, are non-analogous. It is improper to reject claims on the basis of non-analogous art. *See, e.g., In re Oetiker*, 977 F.2d 1443, 1446 (Fed. Cir. 1992). These references are neither in the same field of endeavor as the presently claimed invention, nor is it reasonably pertinent to a chip for use in container

manufacture. Inherency cannot be used to establish grafted polymer when the reference allegedly containing the inherent disclosure is from a non-analogous field.

It is improper in a § 103 obviousness argument to suggest inherency. Inherency is only appropriate when the entire invention is inherently disclosed in a single reference as such is not the case in this rejection. Further, there is no reason based on these references to believe that a cyclodextrin is bonded to a polyolefin through a maleic anhydride group arises from these references. Based on our discussion of the prior art in this case, no one of ordinary skill in the art would expect that cyclodextrin could be grafted to a polyolefin through an anhydride group.

Applicants have demonstrated the patentability of claim 16 since the prior art does not relate to a chip, a blended polyolefin with a grafted polyolefin or the grafting of cyclodextrin to a polyolefin through an acid anhydride. None of the prior art shows using an anhydride functionality of about 0.02 to 5 wt% of the functionalized polyolefin.

Applicants have also demonstrated the patentability of claim 82 for similar reasons. Additionally, other claims are patentable for additional reasons.

Claims 17 and 83 are clearly patentable since the melt index limitations for the grafted polymer and the polyolefin are not disclosed in the prior art. Similarly, the melt indexes of claims 18 and 84 are not shown in the art.

Claim 91 is allowable since the prior art does not show that the grafted polyolefin can contain 0.01 to 8 wt% of the cyclodextrin grafted polyolefin.

Claim 162 is patentable since the prior art does not suggest that the chip can contain 0.01 to 10 wt% of the grafted polymer based on the ungrafted polymer.

Claim 163 is additionally patentable since the prior art does not teach coating a polyolefin resin with the cogenerated polyolefin resin.

Claim 165 is patentable over the prior art since the art does not show the amount of cogenerated polymer.

In view of the above amendments and remarks, Applicants respectfully request a Notice of Allowance. If the Examiner believes a telephone conference would advance the prosecution of this application, the Examiner is invited to telephone the undersigned at the below-listed telephone number.

Respectfully submitted,

30 Aug 2006
Date

Mark DiPietro
Mark DiPietro
Reg. No. 28,707
MERCHANT & GOULD P.C.
P.O. Box 2903
Minneapolis, MN 55402-0903
Telephone: (612) 371-5375
E-mail: mdipietro@merchant-gould.com

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UNIVERSITY OF MINNESOTA

*Duluth Campus**Department of Chemistry and Biochemistry
College of Science and Engineering**1039 University Drive
Duluth, MN 55812-3020**Office: 218-726-7212
Fax: 218-726-7394
<http://www.duluth.umn.edu/chem/>
Email: chem@duluth.umn.edu*

April 11, 2006

Dr. Will Wood
CELLRESIN TECHNOLOGIES, LLC
1789 Buerkle Circle
St Paul, MN 55110-5254

Re: U.S. Patent Application Serial No. 10/672,297
GRAFTED CYCLODEXTRIN
M & G REF: 11816.56-US-U1

Dear Will:

I have examined the 15 sets of material you sent me in regards to the above patent requests. I read especially carefully the objections raised by the examiner Olga Asinovsky and the responses by Mark DiPietro of Merchant & Gould PC and Mark Harrison of Wacker Chemical Chemicals. I agree 100% with their assessment and comments. The above patent is unique and different from the Wood '565, the Sun, and the Videau patents.

I might emphasize that the chemistry in these patents are very distinct. The Wood '565 patent involves the modification of polymer properties by diffusing CD functional derivatives into the polymer matrix as a means to take advantage of the useful physical encapsulating properties of the CD molecules.

The grafting characteristic in the present patent request is not shared by any of the other three patents, and the chemistry is not related. In the present patent request there exists the novel idea of grafting a CD directly to the backbone of a synthetic polymer. The procedure for doing this is in no way related to the chemistry in the other three patents in that it involves a mechanistically free radically induced combination of the polymer to a CD. To do this it uses a free radically induced synthesis by forming a Carbon-Carbon covalent bond to maleic anhydride. This tethered anhydride can react in a typical heterolytic fashion with a hydroxyl on the CD to generate a grafted polymer. This tethering is unique to the present patent as there is no free radically induced tethering in the other three.

The Sun and Videau patents both involve natural polymers, cellulose and starch respectively. Both of these natural polymers are large polymeric glucose molecules and it is not surprising they interact with a CD, a small polymeric glucose molecule by typical acetal sugar chemistry-

which is not a free radical and while they might be related to each other, neither one is related to present patent request.

Again I agree with all the suggestions that there is no way from the existing three patents that one could consider the present patent request as an extension of existing patented technology

Sincerely,



Ron Caple
Professor of Chemistry
Morse Alumni Distinguished Professor of Chemistry
Doctor Honoris Causa of the Russian Academy of Sciences
Honorary Doctorate of Petrozavodsk State University
Doctor Honoris Causa of Moscow State University
Telephone: 218/726-7215
Fax: 218/726-7394
Email: rcaple@d.umn.edu

c: Jim Riehl, Dean CSE
Bilin Tsai, Chair, Department of Chem